

REMARKS

In the foregoing amendments, claims 37, 40 and 86 were amended to recite that the enzyme retains endoglucanase activity under alkaline conditions. See, for example, page 4 and figures 1-2 of applicant's specification disclosure. Claims 40, 60, and 86 were amended to better clarify that the claimed endoglucanases were isolated as suggested by the examiner in the Office action. Support of the isolation of the claimed endoglucanases can be found throughout the specification in the examples section. In addition, claim 40 was amended by deleting the expression: "or a modified protein exhibiting endoglucanase activity and having a modification such as an addition, insertion, deletion or substitution of one or several amino acids." Claim 71 was amended to provide proper antecedent basis for a limitation therein.

Claims 1-11, 13-56, and 58-86 are pending in the application. Claims 1-11, 13-36, 41-56, 58, and 59 were withdrawn from consideration. Accordingly, claims 37-40 and 60-86 are in the application for consideration by the examiner at this time.

Claims 40, 60, and 86 were rejected under 35 U.S.C. § 101 as directed to a product of nature. In the Official action, the examiner recommended using the phrase "an isolated" protein or polynucleotide. In the foregoing

amendments, claims 40, 60, and 86 were amended to include the expression "an isolated," as suggested in the outstanding Office action. Therefore, applicant respectfully requests that the examiner reconsider and withdraw the rejection under 35 U.S.C § 101.

Claim 71 was rejected under 35 U.S.C. § 112, second paragraph, on page 2 of the Official action as providing insufficient antecedent basis for the limitation "host cell according to claim 63". In the foregoing amendments, the phrase "host cell according to claim 63" in claim 71 was amended to "host cell according to claim 65" to provide proper antecedent basis for the host cell. Accordingly, applicant respectfully requests that the examiner reconsider and withdraw the rejection of claim 71 under 35 U.S.C § 112, second paragraph.

Claims 37-40 and 60-85 were rejected under 35 U.S.C. § 112, first paragraph, beginning on page 3 of the Official action. In particular, the Official action stated that the specification is enabling for an endoglucanase enzyme with specific disclosed SEQ ID NOs, but not enabling for modified endoglucanases or homologues of said endoglucanases or endoglucanases having a CBD as claimed in claim 38. The Official action also stated that there is no written description in the specification of modified/homologue polypeptide and polynucleotide sequences encompassed by the claims.

In the foregoing amendments, claim 40 was amended by deleting the expression: "or a modified protein exhibiting endoglucanase activity and having

a modification such as an addition, insertion, deletion or substitution of one or several amino acids.” Therefore, applicant respectfully submits that this rejection is now moot with respect to claim 40 and claims 60-80 that depend directly or indirectly from claim 40.

Applicant respectfully disagrees and submits that claims 37-39 are not enabled by the present specification disclosure for at least the reasons set forth in the response filed on December 19, 2003, which are incorporated herein by reference, and the following reasons. Claim 37 lists specific criteria for the claimed endoglucanases including having a cellulose-binding domain located on its N-terminal side and retaining endoglucanase activity under alkaline conditions. In determining what experimentation is undue experimentation, the Official action concluded that any endoglucanase modified in any manner falls within the scope of the claims. However, any enzyme that does not maintain endoglucanase activity under alkaline conditions falls outside the scope of the claims 37-39. The specification provides numerous instances of amino acid modifications as well as reasoning for modifying the enzyme, for example, modification of asparagine, for linking oligosaccharide chains to guide the ordinary artisan. Therefore, one of ordinary skill in the art would be enabled to make and use the invention as set forth in claims 37-39 without undue experimentation. Therefore, applicant respectfully requests that the examiner reconsider and withdraw this rejection.

Claims 37-40 and 60-85 were also rejected under 35 U.S.C. 112, first paragraph, as being based on an inadequate written description in the specification of modified/homologue polypeptide and polynucleotide sequences encompassed by the claims. The Official action stated that the CBD of endoglucanases from three different species is insufficient written description because the claims are not limited to CBD but to endoglucanases and polynucleotides encoding the same. The Official action contended that the claimed genera is structurally diverse and for an unpredictable art, adequate written description of a genus which embraces widely variant species cannot be achieved by disclosing only one, two or three species within the genus.

As mentioned above in the foregoing amendments, claim 40 was amended by deleting the expression: "or a modified protein exhibiting endoglucanase activity and having a modification such as an addition, insertion, deletion or substitution of one or several amino acids." Therefore, applicant respectfully submits that this rejection is now moot with respect to claim 40 and claims 60-80 that depend directly or indirectly from claim 40.

Applicant respectfully submits that the present specification disclosure provides an adequate written description of the invention set forth in claims 37-39 within the meaning of the first paragraph of 35 U.S.C §112. In particular, the present specification discloses identification, isolation and characterization of a novel CBD from three different species. Given the

methods outlined in the specification for enzyme activity measurement, partial amino acid sequencing, isolation of a coding sequence including primer selection, library screening, means for identifying enzyme activity and consensus sequences, the ordinary artisan would have a reasonable expectation of success. Given the descriptions in applicant's specification disclosure, even if it was necessary for one of ordinary skill in the art to perform a substantial amount of experimentation that would require a fair amount of time; such experimentation would not amount to undue experimentation, because the person of ordinary skill in the art following the present specification disclosure has a reasonable expectation of success of identification of additional CBD containing sequences using these disclosed methods. For the foregoing reasons, applicant respectfully submits that the present specification disclosure provides an adequate written description of claims 37-39 within the meaning of 35 U.S.C §112, first paragraph. Therefore, applicant respectfully requests that the examiner reconsider and withdraw this rejection.

The Official action maintained the rejection of claims 40 and 60-85 under 35 U.S.C. § 102(b) as being anticipated by WO94/07998 of Schulein or under 35 U.S.C §100 to eat as being anticipated by US patent No. 6,387,690 of Schulein *et al.* (hereinafter collectively referred to as "Schulein"). The Official action stated that Schulein discloses an endoglucanase derived from fungi and

belonging to family 45 and its use in a variety of processes. The Official action concluded that since no limitation is placed on the number of changes that can be present in the amino acid sequence of SEQ ID NOS: 1, 3, 5, 7, 9, or 11, the sequence disclosed by Schulein anticipates the application as written.

The Official action also maintained the rejection of claims 37-40 and 72-73 under 35 USC 102(b) as being anticipated by U.S. patent No. 4,966,850 of Yu *et al.* (hereinafter referred to as "Yu"). The Official action stated that the claims are drawn to an endoglucanase, sometimes a protein, and sometimes a cellulase preparation. The Official action then concluded that the claims are drawn to "cellulase."

Applicant respectfully submits that the teachings of Schulein and/or Yu do not disclose or suggest the invention as set forth in the presently claimed invention within the meaning of 35 U.S.C. §102 or 35 U.S.C. §103.

Present claims 40 and 60-85 specifically define the amino acid sequence of SEQ ID NOS: 1, 3, 5, 7, 9, or 11, which are not contemplated or suggest by the teachings of Schulein or Yu. Therefore, applicant respectfully requests that the examiner reconsider and withdraw the rejection of claims 40 and 60-85 over these teachings.

With respect the claims 37-39, these claims require that the claimed enzyme must retain endoglucanase activity under alkaline conditions. The assays of Yu are carried out at neutral pH levels (Figure 3) whereas the

enzymes of the presently claimed invention retain endoglucanase activity under alkaline conditions. Any enzyme activity of the *Mucor* sp. disclosed by Yu, which is very low, would not be active at alkaline pH levels (see alkaline pH and % activity in figure 3). Therefore, the enzymes of Yu are patently distinct from those of the present invention. For such reasons, applicant respectfully requests that the examiner reconsider and withdraw the rejection of all of applicant's claims over the teachings of Yu.

Claims 37-40, 72-73, and 86 were rejected under 35 U.S.C. § 102(b) as being anticipated by or, in the alternative, under 35 U.S.C. § 103(a) as obvious over Somkuti (*J. Gen. Microbiol.*, 1974, Vol. 81, pages 1-6). The Official action stated that the Somkuti teaches isolated enzymes from *Mucor* sp. and cellulolytic activity as well as β -glucosidase activity separated out. The Official action admitted that the Somkuti does not explicitly disclose endoglucanase activity. However, the Official action concluded that since the enzymes are isolated from the same source, the isolated enzyme of the reference inherently has all of the characteristics of the claimed enzymes.

Applicant respectfully submits that the teachings of Somkuti cannot disclose or suggest the presently claimed invention within the meaning of 35 U.S.C §102 or 35 U.S.C §103(a) for at least the following reasons. The teachings of Somkuti propose measurement of cellulase activity, but are silent as to any measure of endoglucanase activity. The cellulase activity measured

in the methods proposed by Somkuti used CMC and swollen cellulose/crystalline cellulose at pH 5.0 (see, for example the methods section on page 2), whereas the enzymes of the presently claimed invention retain endoglucanase activity under alkaline conditions. Any enzyme activity of the *Mucor* sp. as proposed by Somkuti would not be active at alkaline pH levels. Thus, applicant respectfully submits that the enzymes of Somkuti are patently distinct from those of the presently claimed invention. Therefore, applicant respectfully requests that the examiner reconsider and withdraw this rejection.

Claims 60-71 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Somkuti as applied to the claims above and further in view of common knowledge in the art regarding protein purification techniques and general molecular biology, as taught in Sambrook (Molecular Cloning, A Laboratory Manual, 2nd Ed, Cold Spring Harbor Laboratory Press, 1989, pages 7.37-7.52).

The enzymes proposed by Somkuti are distinguishable from those presently claimed for the reasons set forth above. In particular, the endoglucanases of applicant's claims exhibit endoglucanase activity at an alkaline pH, which is not possible for the enzymes proposed by Somkuti. The teachings of general molecular biological techniques are silent as to endoglucanase enzyme characteristics or activity. Therefore, any combination of Somkuti and the general molecular biological techniques would not motivate

one of ordinary skill in the art to the invention as set forth in applicant's claims. Therefore, applicant respectfully requests that the examiner reconsider and withdraw this rejection.

In summary, applicant respectfully submits that the inventions as set forth in claims 37-40 and 60-86 are in condition for allowance. The inventions as set forth in these claims are not taught or made obvious by any combination of Schulein, Yu, and/or Somkuti. Further, these claims are fully described and enabled by applicant's specification disclosure as originally presented.

In light of the foregoing amendments and remarks, a formal allowance of claims 37-40 and 60-86, together with withdrawn claims 1-11, 13-36, 41-56, 58, and 59, is respectfully requested. While it is believed that all the claims in this application are in condition for allowance, should the examiner have any comments or questions, it is respectfully requested that the undersigned be telephoned at the below listed number to resolve any outstanding issues.

In the event this paper is not timely filed, applicant hereby petitions for an appropriate extension of time. The fee therefor, as well as any other fees which become due, may be charged to our deposit account No. 22-0256.

Respectfully submitted,
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